

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph beginning at page 1, line 19, with the following rewritten paragraph:

-- In order to mount electronic parts such as integrated circuits on electronic equipment, film carrier tapes for mounting electronic ~~part~~parts are employed. The film carrier tapes for mounting electronic ~~part~~parts are produced by forming a wiring pattern made of a conductive metal on a surface of a long insulating film, and most of the film carrier tapes are produced by further forming a solder resist layer on a surface of the wiring pattern except a terminal portion. In such film carrier tapes for mounting electronic ~~part~~parts, thermosetting resins such as epoxy resins are employed for forming the solder resist layer. --

Please replace the paragraph beginning at page 2, line 7, with the following rewritten paragraph:

-- In the film carrier tapes for mounting electronic ~~part~~parts having no solder resist layer, ~~there is not no large warpage distortion is observed large warpage distortion~~. The thermosetting resins for forming the solder resist layer, however, have properties such that they slightly suffer cure shrinkage when they are cured by heating, and in the film carrier tapes for mounting electronic ~~part~~parts having such a solder resist layer, warpage distortion in the width direction or the lengthwise direction is brought about by the cure shrinkage of the thermosetting resin for forming the solder resist layer. --

Please replace the paragraph beginning at page 3, line 5, with the following rewritten paragraph:

-- In ~~the~~a recent technique for mounting electronic parts, film carriers each having an area substantially the same as that of an electronic part to be mounted, such as COF (chip on film), CSP (chip size package) and BGA (ball grid array), ~~came to be~~have been used more frequently. Because such a film carrier occupies a small area, plural film carriers (e.g., 2 or 4 film carriers) can be arranged side by side in the width direction of a tape made of an insulating film in the production of a film carrier tape. In CSP, COF, BGA or the like, a solder resist layer is formed in each of the film carriers, so that each film carrier having a solder resist layer suffers warpage, and even if reverse warpage is applied to the tape having

plural film carriers formed side by side in the width direction, the tape is bent at the boundary between the film carriers adjacent to each other in the width direction. Therefore, effective reverse warpage cannot be given to each of the curved (warped) film carriers. Under the existing circumstances, accordingly, there is no effective warpage-removal method to correct warpage distortion of each film carrier in a film carrier tape for mounting electronic ~~part~~parts wherein plural film carriers are formed in the width direction of the tape such as CSP and BGA. --

Please replace the section heading beginning at page 4, line 8, with the following rewritten section heading:

-- ~~DISCLOSURE~~ SUMMARY OF THE INVENTION --

Please replace the paragraph beginning at page 4, line 9, with the following rewritten paragraph:

-- It is an object of the present invention to provide a film carrier tape for mounting electronic ~~part~~parts in which plural film carriers are formed in the width direction of the tape and warpage distortion of each film carrier is reduced. --

Please replace the paragraph beginning at page 4, line 14, with the following rewritten paragraph:

-- The film carrier tape for mounting electronic ~~part~~parts of the present invention is a film carrier tape comprising a long insulating film and a large number of wiring patterns formed on a surface of the insulating film, said wiring patterns being made of a conductive metal, wherein: --

Please replace the paragraph beginning at page 5, line 1, with the following rewritten paragraph:

-- The film carrier tape for mounting electronic ~~part~~parts of the present invention is also a film carrier tape comprising a long insulating film and a large number of wiring patterns formed on a surface of the insulating film, said wiring patterns being made of a conductive metal and at least two of said wiring patterns being arranged side by side in the width direction of the long insulating film, wherein: --

Please replace the paragraph beginning at page 5, line 14, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~parts of the present invention, the solder resist layer is formed by dividing and applying a solder resist, and in each of the divided sections of the solder resist layer, the stress attributable to cure shrinkage is small. Therefore, distortion of the film carrier can be reduced. --

Please replace the paragraph beginning at page 5, line 22, with the following rewritten paragraph:

-- Fig. 1 is a plan view showing an example of a film carrier tape for mounting electronic ~~part~~parts of the present invention. --

Please replace the paragraph beginning at page 6, line 3, with the following rewritten paragraph:

-- Fig. 3 is a view to explain a film carrier for constituting a film carrier tape for mounting electronic ~~part~~parts of the present invention by taking out one film carrier. --

Please replace the paragraph beginning at page 6, line 7, with the following rewritten paragraph:

-- ~~Fig. 4 is a group of~~ Figs. 4(a) and 4(b) are two cross-sectional side views showing a method of measuring warpage distortion of a film carrier in the present invention. --

Please replace the paragraph beginning at page 6, line 10, with the following rewritten paragraph:

-- ~~Fig. 5 is a group of~~ Figs. 5(a) and 5(b) are two plan views each showing an example of a film carrier tape for mounting electronic ~~part~~parts of the present invention wherein a solder resist layer is formed in a region of not less than 20% of the wiring patterns except terminal portions. --

Please replace the paragraph beginning at page 6, line 15, with the following rewritten paragraph:

-- ~~Fig. 6 is a group of~~ Figs. 6(a) and 6(b) are two cross sectional views showing examples of divided sections of a solder resist layer. --

Please replace the section heading beginning at page 6, line 18, with the following rewritten section heading:

-- ~~PREFERRED EMBODIMENTS~~ DETAILED DESCRIPTION OF THE INVENTION --

Please replace the paragraph beginning at page 6, line 19, with the following rewritten paragraph:

-- The film carrier tape for mounting electronic ~~part~~ parts of the present invention is described in detail hereinafter referring to the attached drawings. --

Please replace the paragraph beginning at page 6, line 22, with the following rewritten paragraph:

-- Fig. 1 is a plan view showing an example of the film carrier tape for mounting electronic ~~part~~ parts of the present invention, and Fig. 2 is a cross sectional view taken on line A-A' of Fig. 1. --

Please replace the paragraph beginning at page 7, line 3, with the following rewritten paragraph:

-- As shown in Fig. 1 and Fig. 2, the film carrier tape 10 for mounting an electronic part of the present invention comprises a long insulating film 11 and a large number of film carriers 12 formed on a surface of the insulating film. --

Please replace the paragraph beginning at page 9, line 22, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~ parts of the present invention, plural film carriers 12 each of which ~~is constituted of~~ contain the wiring pattern made of the conductive metal are arranged in the width direction of the tape. In Fig. 1, an embodiment wherein two film carriers 12 are arranged side by side in the width direction of the tape is shown. --

Please replace the paragraph beginning at page 10, line 5, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~ parts of the present invention, plural film carriers 12 are arranged independently from one another in the width direction of the tape. For example, on the insulating film 11 having an effective width of 35 mm, two film carriers each having a side length of 14 mm can be arranged side by side in the

width direction, and on the insulating film 11 having an effective width of 70 mm, four film carriers each having a side length of 14 mm can be arranged side by side in the width direction. --

Please replace the paragraph beginning at page 10, line 15, with the following rewritten paragraph:

-- In the case where the film carrier formed in the film carrier tape 10 for mounting electronic ~~part~~parts is CSP or BGA, the surface of the wiring pattern 15 formed on the insulating film 11 is applied with a solder resist ink except a terminal portion 16 that ensures connection to an electronic part, whereby a solder resist layer 20 is formed. The resin applied to form the solder resist layer 20 is usually a coating liquid (solder resist ink) in which a thermosetting resin is dissolved or dispersed in an organic solvent. By applying such a solder resist ink and then heating it, the solder resist layer 20 is formed. When the solder resist ink is cured to form the solder resist layer 20, the resin of the solder resist layer 20 ~~slightly suffers slight~~ cure shrinkage, and as. ~~As a result, warpage distortion in a state such that the solder resist layer 20 being inner side takes place in a~~ an inner side region where the solder resist ink is applied. --

Please replace the paragraph beginning at page 11, line 8, with the following rewritten paragraph:

-- Some film carrier tapes for mounting electronic ~~part~~parts do not need formation of a solder resist layer. --

Please replace the paragraph beginning at page 13, line 1, with the following rewritten paragraph:

-- That is to say, in the film carrier tape 10 for mounting electronic ~~part~~parts of the present invention, the solder resist layer 20 is formed by dividing the region to be coated into plural sections, i.e., ~~A~~ a first section 20a, ~~B~~ a second section 20b, ~~C~~ a third section 20c and ~~D~~ a fourth section 20d, and applying ~~them with a~~ solder resist ink to each section 20a-20d, as shown in Figs. 1 to 3. --

Please replace the paragraph beginning at page 13, line 18, with the following rewritten paragraph:

-- In Figs. 1 to 3, the region where the solder resist layer 20 is formed is a joined area of the ~~A~~ first section 20a, the ~~B~~ second section 20b, the ~~C~~ third section 20c and

the ~~D-fourth~~ section 20d. In the conventional technique, the solder resist is applied to these sections in one united body. However, if the solder resist is applied to such a wide region and cured, the resin suffers cure shrinkage, and as a result, warpage distortion ~~in such a state takes place, such~~ that the solder resist layer 20 being on the inner side as shown in Fig. 4, ~~occurs~~ causes warpage distortion on each film carrier 12. --

Please replace the paragraph beginning at page 14, line 4, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part-parts~~ of the present invention, the region to be coated with a solder resist is divided into plural sections, and these sections are applied with the solder resist. That is to say, the region to be coated with the solder resist is a joined area of the ~~A-first~~ section 20a, the ~~B-second~~ section 20b, the ~~C-third~~ section 20c and the ~~D-fourth~~ section 20d in Figs. 1 and 3, however in the embodiment shown in Figs. 1 and 3, this region is divided into 4 sections, then these sections are each applied with the solder resist independently from the adjacent sections, and the solder resist is cured to form a solder resist layer 20 having been divided into 4 sections. In case of a film carrier having a longitudinal length of less than 5 mm and a crosswise length of less than 5 mm, such warpage distortion that becomes a problem rarely occurs. In the present invention, therefore, it is preferable to divide the solder resist layer in case of a film carrier having a longitudinal length of not less than 5 mm and a crosswise length of not less than 5 mm. --

Please replace the paragraph beginning at page 15, line 23, with the following rewritten paragraph:

-- In the film carrier tape 10 for mounting electronic ~~part-parts~~ of the present invention, the shape and the relative size of each of the split and/or divided sections of the solder resist layer 20 are not specifically restricted, however it is preferable to divide the region to be covered with the solder resist as equally as possible. By uniformizing the stress produced in each section, the distortion of the whole film carrier can be further reduced. That is to say, it is preferable that the areas of the sections are equalized to one another and the shapes of the sections are made substantially the same as one another. In the film carrier tape for mounting electronic ~~part-parts~~ of the present invention, the length of one side of each section of the divided solder resist is desired to be in the range of about 2 to 10 mm, preferably about 2.5 to 7.5 mm. --

Please replace the paragraph beginning at page 16, line 15, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~parts of the present invention, the film carrier formed by splitting and/or dividing the solder resist layer is not limited to the aforesaid CSP or BGA, and the film carrier can be applied to general TAB tapes. For example, as shown in Figs. 5(a) and 5(b), the film carrier can be applied to a film carrier tape for mounting electronic ~~part~~parts wherein a solder resist layer is formed in a region of not less than 30% of the wiring patterns (except terminal portions). In Fig. 5(a), an example wherein a solder resist layer having been divided into 12 sections is formed on wiring patterns 15 formed on a surface of an insulating film 11 having a device hole is shown. The wiring patterns shown in Fig. 5(a) are only examples and do not restrict those employable in the present invention. In Fig. 5(b), an example wherein the solder resist layer 20 is divided into 2 sections is shown, but in this figure, wiring patterns formed on a surface of the insulating film 11 are not shown. Dividing of the solder resist layer is useful for a film carrier tape for mounting electronic ~~part~~parts wherein a solder resist layer is formed in a region of not less than 30% of wiring patterns except terminal portions, as shown in Figs. 5(a) and 5(b). --

Please replace the paragraph beginning at page 18, line 6, with the following rewritten paragraph:

-- The thickness (h_0) of the solder resist layer split or divided as above is the same as that of a conventional solder resist layer, and the solder resist layer on the upper surface of the wiring pattern has an average thickness of usually 3 to 50 μm , preferably 5 to 40 μm , after curing. In the film carrier tape for mounting electronic ~~part~~parts of the present invention, the solder resist layer 20 is split or divided as shown in Fig. 6(a), and between the adjacent sections, there is an area where no solder resist layer is formed as above. However, the internal stress produced in one section has only to be not transmitted to the adjacent section, so that the section of the solder resist layer 20 may be connected to its adjacent section at least in part, as shown in 6(b). In this case, the thickness (h_1) of the solder resist layer between these sections is not more than 1/2 of the usual thickness (h_0) of the solder resist layer, and h_1 may be 0. --

Please replace the paragraph beginning at page 19, line 1, with the following rewritten paragraph:

-- In order to form the divided solder resist layer 20, masking is made on a conventional screen correspondingly to the sections, and the only resin has ~~only~~ to be applied. In case of a solder resist of the adhesion type, which recently has begun to be adopted ~~recently~~, a gap is formed, and then only the solder resist has ~~only~~ to be allowed to adhere. In case of a solder resist using a photosensitive resin, the resin is applied, and then only the resin has ~~only~~ to be exposed and developed so as to split and/or divide the solder resist layer. The solder resist layer whose divided sections are connected to one another at least in part can be formed by controlling a line width of a screen mask that is used when a solder resist coating liquid is applied. --

Please replace the paragraph beginning at page 20, line 3, with the following rewritten paragraph:

-- The film carrier tape for mounting electronic ~~part~~ parts of the present invention produced as above can be used in a usual manner. For example, on the divided solder resist layer formed as above, an electronic part (not shown in the figures) is arranged by the use of an adhesive or the like, and electrical connection is made between the connecting terminal 16 and a bump electrode provided on the electronic part, whereby mounting of the electronic part can be achieved. For making electrical connection, a conductive metal wire such as a gold wire can be employed. In the film carrier tape for mounting electronic ~~part~~ parts of the present invention, the film carrier has an area substantially the same as an area of the electronic part to be mounted, but the present invention is not limited to such a film carrier tape. --

Please replace the paragraph beginning at page 20, line 18, with the following rewritten paragraph:

-- The connecting terminal 16 of the film carrier tape for mounting an electronic part of the present invention is connected to a solder ball through the wiring pattern 15. --

Please replace the paragraph beginning at page 20, line 21, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~parts of the present invention, the solder resist layer is split or divided as described above, and therefore, warpage distortion of a film carrier attributable to the cure shrinkage of the solder resist occurring in the curing can be reduced. --

Please replace the paragraph beginning at page 21, line 3, with the following rewritten paragraph:

-- Distortion of the film carrier in the film carrier tape for mounting electronic ~~part~~parts of the present invention is measured in the following manner. As shown in Fig. 4(a), a point of the film carrier tape, at which a sprocket hole to carry the film carrier tape is formed, is taken as a standard point. Then, with regard to one film carrier of the film carrier tape produced, heights of measuring points ① to ⑤ based on the standard point are measured. Using the values obtained, values of ①' (⑤') and ②' (④') of the film carrier (unit) are calculated from the formula $①' = ⑤' = (① + ⑤) / 2$ and the formula $②' = ④' = (② + ④) / 2$, respectively, taking into consideration that the film carrier tape is distorted as shown in Fig. 4. --

Please replace the paragraph beginning at page 22, line 1, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~parts of the present invention, the solder resist layer is formed in such a manner that the layer is split or divided, whereby warpage distortion of a film carrier is reduced, and the film carrier tape for mounting electronic part exhibits high reliability. --

Please replace the paragraph beginning at page 22, line 9, with the following rewritten paragraph:

-- The film carrier tape for mounting electronic ~~part~~parts of the present invention is further described with reference to the following example by comparing it with a film carrier tape which has a solder resist layer formed on the whole surface of a wiring pattern except a connecting terminal and which is liable to suffer warpage. However, it should be construed that the present invention is in no way limited to the example. --

Please replace the paragraph beginning at page 23, line 19, with the following rewritten paragraph:

-- After formation of the solder resist layer consisting of four divided 4 sections, a connecting terminal coated with no solder resist layer and the non-solder resist area were subjected to nickel plating and then gold plating. Thereafter, the whole film carrier tape was subjected to removal of warpage in a conventional manner. --

Please replace the paragraph beginning at page 24, line 8, with the following rewritten paragraph:

-- The results are set forth in Table 1. In Table 1, the terms "upper column" and "lower column" are described in order to distinguish between a film carrier on the upper side and a film carrier on the lower side in such a state that the film carrier tape is arranged as shown in Fig. 1, so that these terms have no relation to the direction of the tape in the production process of the film carrier tape for mounting electronic ~~part~~parts of the present invention. --

Please replace the paragraph beginning at page 25, line 2, with the following rewritten paragraph:

-- A film carrier tape for mounting electronic ~~part~~parts was produced in the same manner as in Example 1, except that the solder resist layer was not divided. --

Please replace the paragraph beginning at page 25, line 5, with the following rewritten paragraph:

-- From the film carriers of the resulting film carrier tape for mounting electronic ~~part~~parts, 12 film carriers in continuous six rows were arbitrarily selected in the same manner as in Example 1, and warpage distortion of these film carriers were measured. --

Please replace the paragraph beginning at page 25, line 14, with the following rewritten paragraph:

-- As is apparent from the comparison between Table 1 and Table 2, by dividing the solder resist layer into 4-four sections, warpage distortion of the film carriers could be reduced to half or less in terms of an average value. --

Please delete the section heading beginning at page 25, line 19.

Please replace the paragraph beginning at page 25, line 20, with the following rewritten paragraph:

-- In the film carrier tape for mounting electronic ~~part~~parts of the present invention, the solder resist layer is split or divided into plural sections, so that a stress ~~that is brought with~~caused by shrinkage occurring in the curing of the solder resist ink is scattered. In the film carrier tape for mounting electronic ~~part~~parts of the present invention, therefore, warpage distortion of a film carrier attributable to the cure shrinkage of the solder resist layer is remarkably reduced, and precision in the mounting of electronic part is surely enhanced. --

Please replace the paragraph beginning at page 26, line 9, with the following rewritten paragraph:

-- The film carrier tape for mounting electronic ~~part~~parts of the present invention is particularly useful as CSP, COF, BGA or the like. --